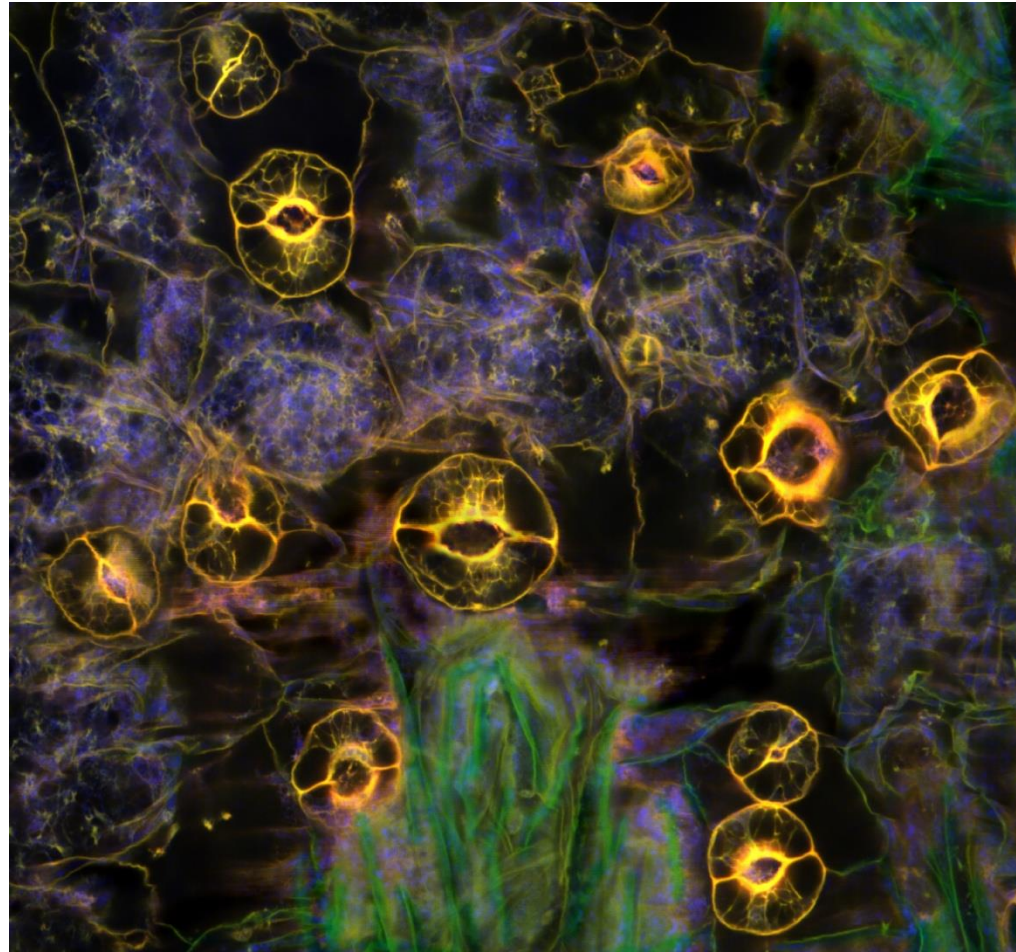


# Photosynthesis



Confocal micrograph of *Arabidopsis thaliana* (thale cress) seedling leaf with stomata (yellow mouth-like structures) and parenchyma cells. Confocal microscopy. Honorable Mention, 2009 Olympus BioScapes Digital Imaging Competition®.



# The Equation

Photosynthesis uses the energy of sunlight to convert water and carbon dioxide into high-energy sugars and oxygen.

Sunlight



Carbon Dioxide + Water → sugars + oxygen

# Light and Pigments

Plants capture the sun's energy with light absorbing molecules called pigments.

Chlorophyll = principle pigment in green plants  
Found in chloroplasts

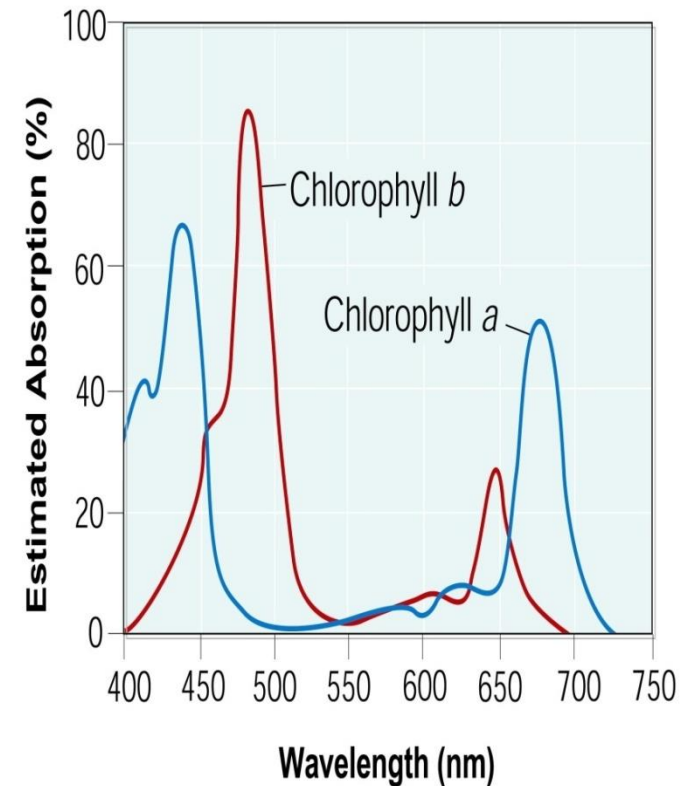


# Light and Pigments

Chlorophyll does NOT absorb light in the green region of the visible spectrum

Absorbs all other colors and REFLECTS green

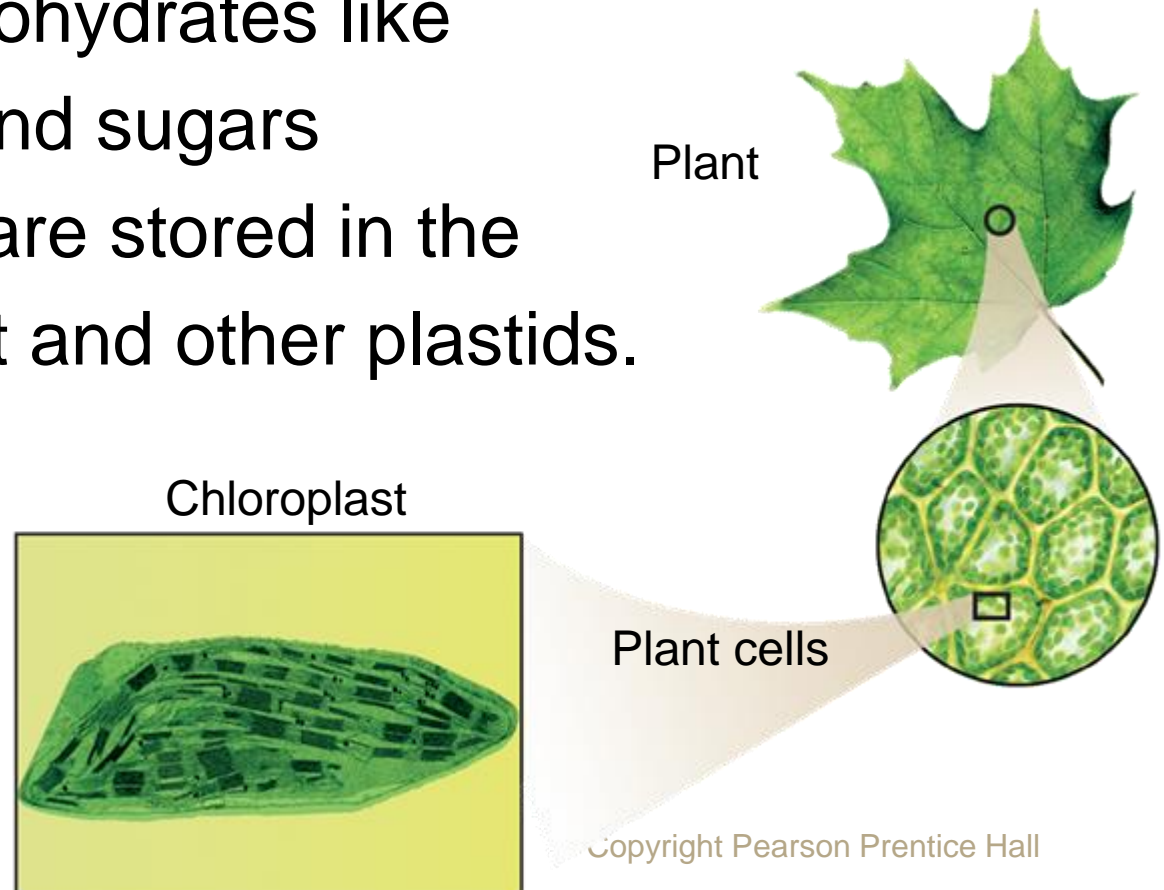
**THIS IS WHY YOU SEE THE GREEN!**



# Inside a Chloroplast

## • Inside a Chloroplast

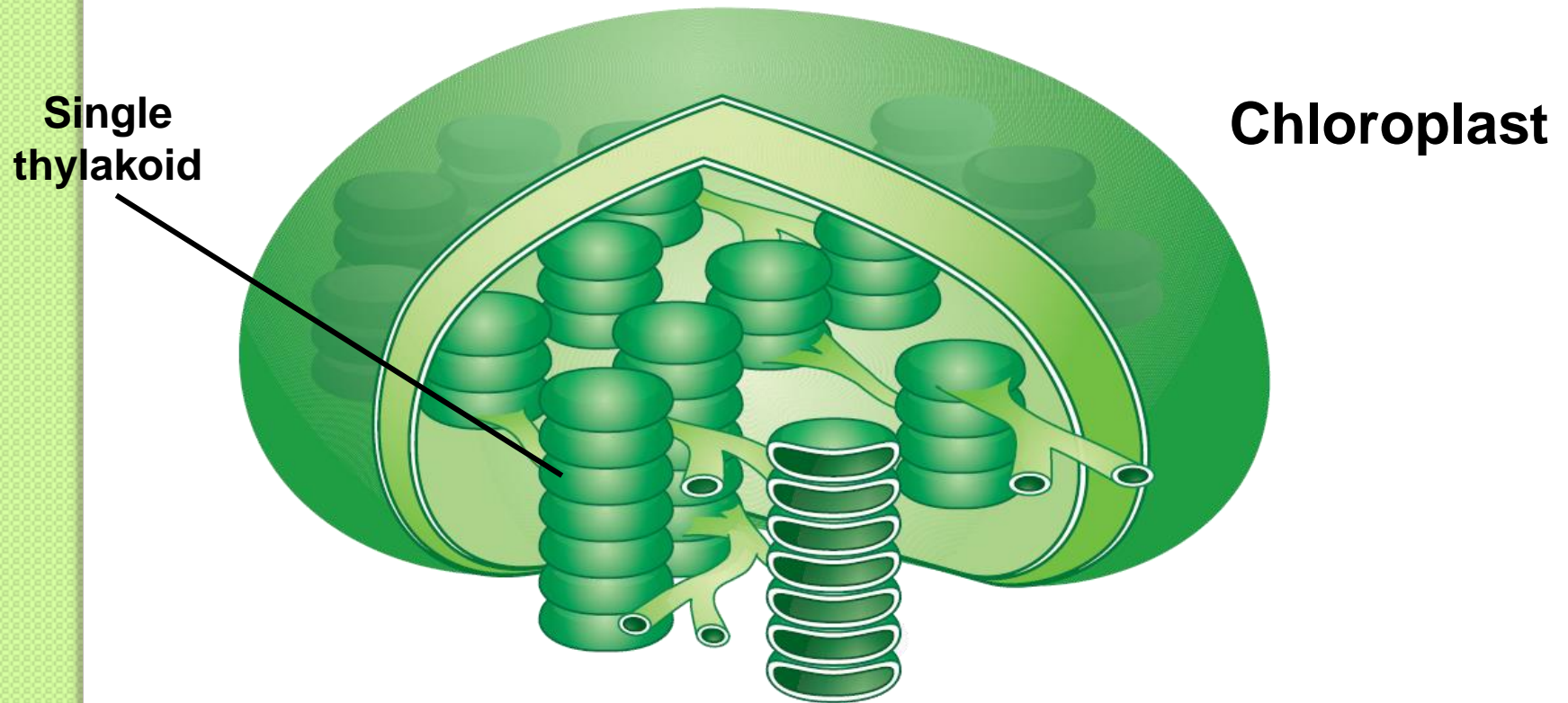
- In plants, photosynthesis takes place inside chloroplasts.
- The carbohydrates like starches and sugars produced are stored in the chloroplast and other plastids.





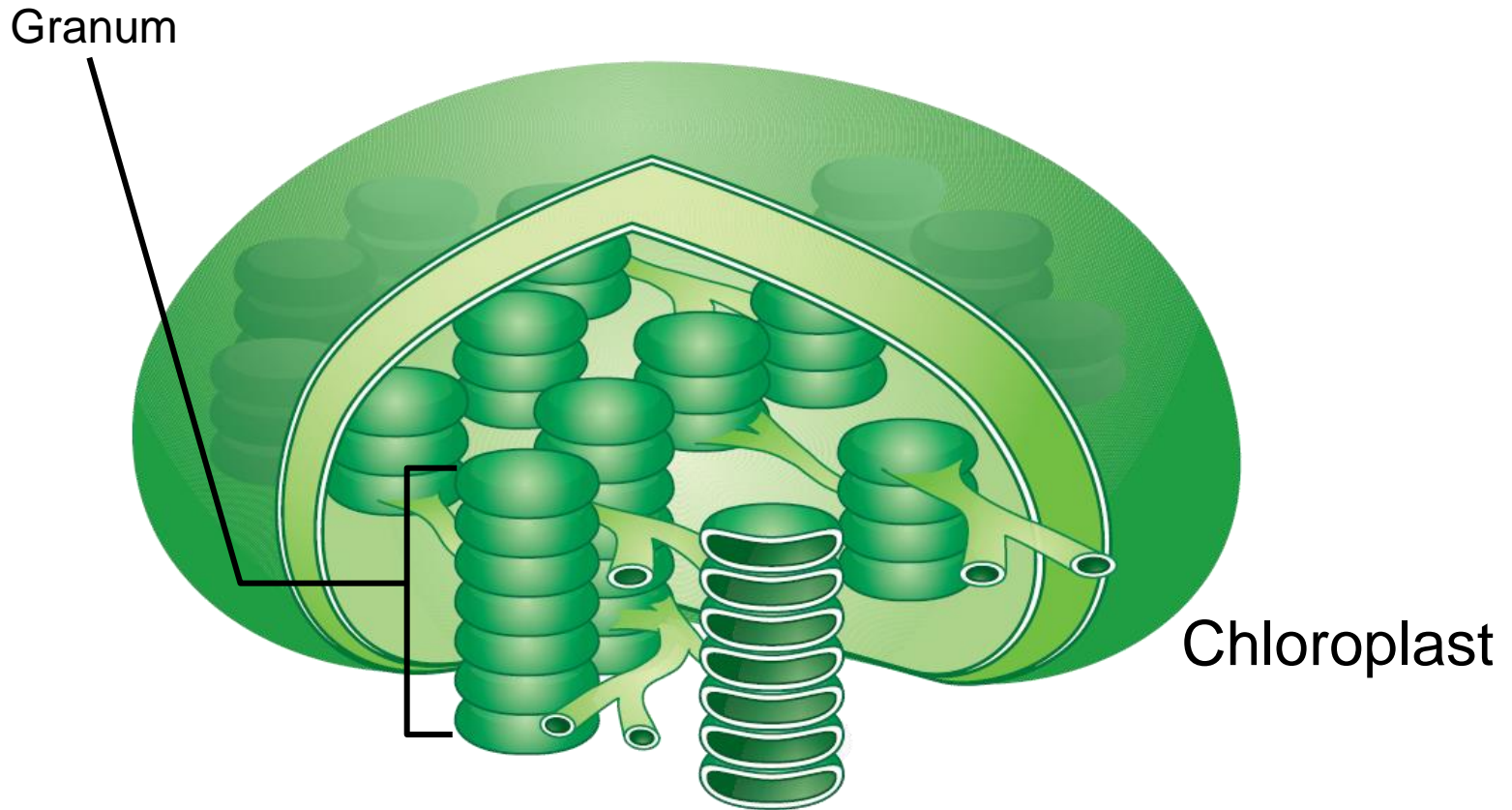
# Inside a Chloroplast

- Chloroplasts contain **thylakoids**—saclike photosynthetic membranes.



# Inside a Chloroplast

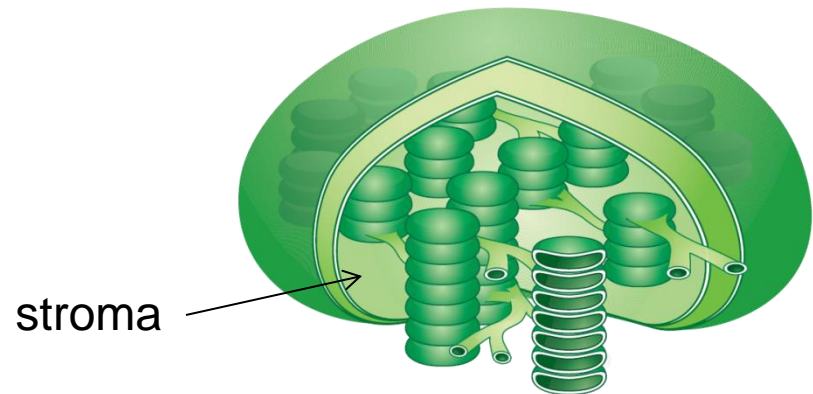
- Thylakoids are arranged in stacks known as grana. A singular stack is called a **granum**.



# The Reactions

There are two reactions in photosynthesis.  
The light-dependent reactions take place within  
the ***thylakoid membranes***.

The Calvin cycle takes place in the ***stroma***,  
which is the region outside the thylakoid  
membranes.







# Light Dependent Reactions

Requires H<sub>2</sub>O

Produces Oxygen

Sunlight excites electrons  
ADP is converted to ATP.

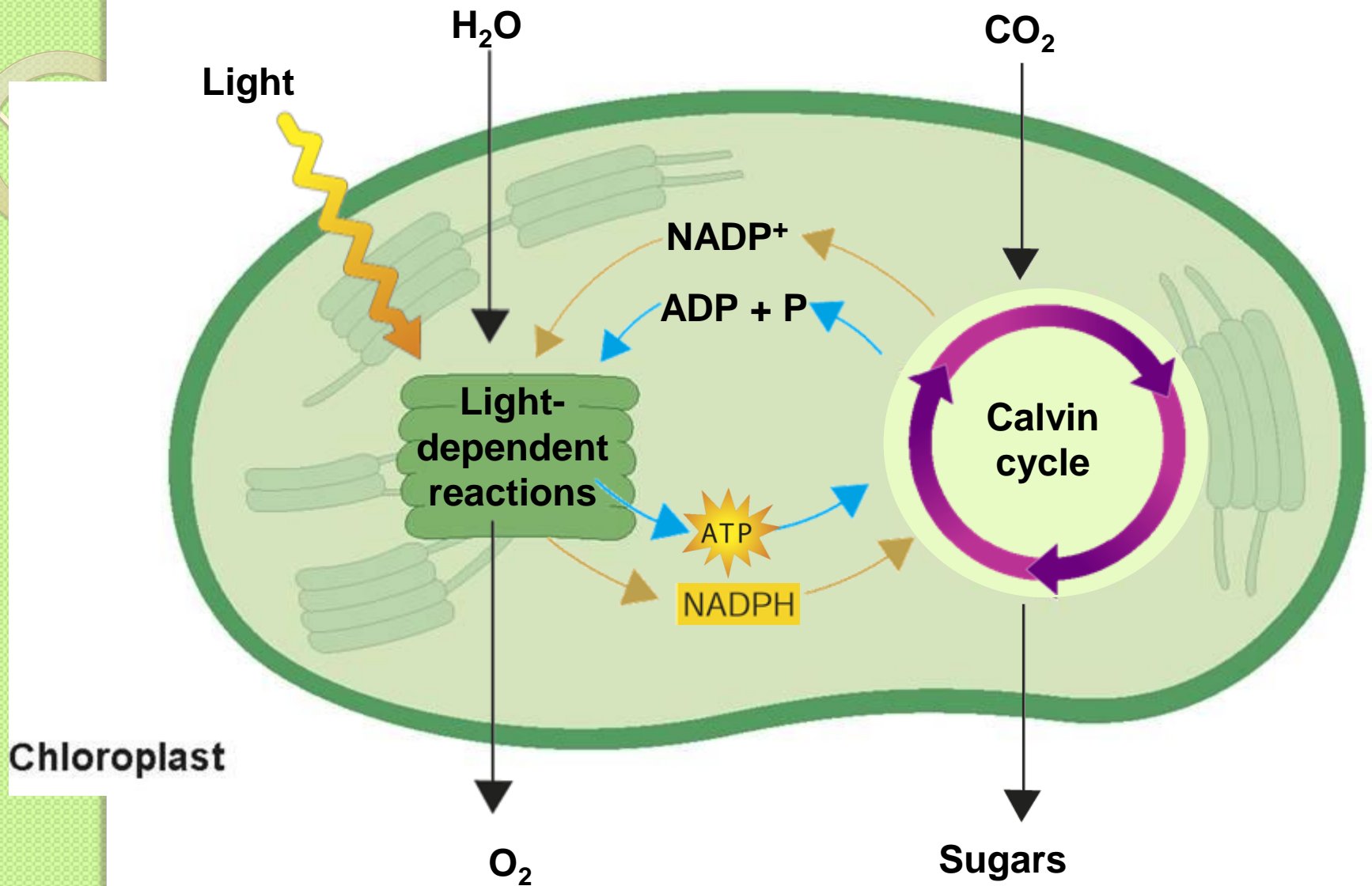


# The Calvin Cycle (Light Independent Reaction)

Requires  $6\text{CO}_2$

Produces 6 carbon sugars (as well as lipids and amino acids)

# Inside a Chloroplast

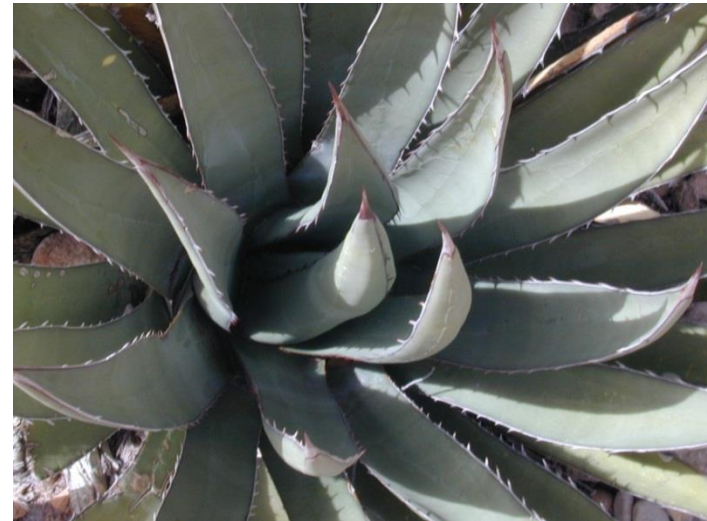


# Factors Affecting Photosynthesis

## Amount of Water

Too little can slow or stop it

Some plants have waxy  
coatings to reduce water  
loss



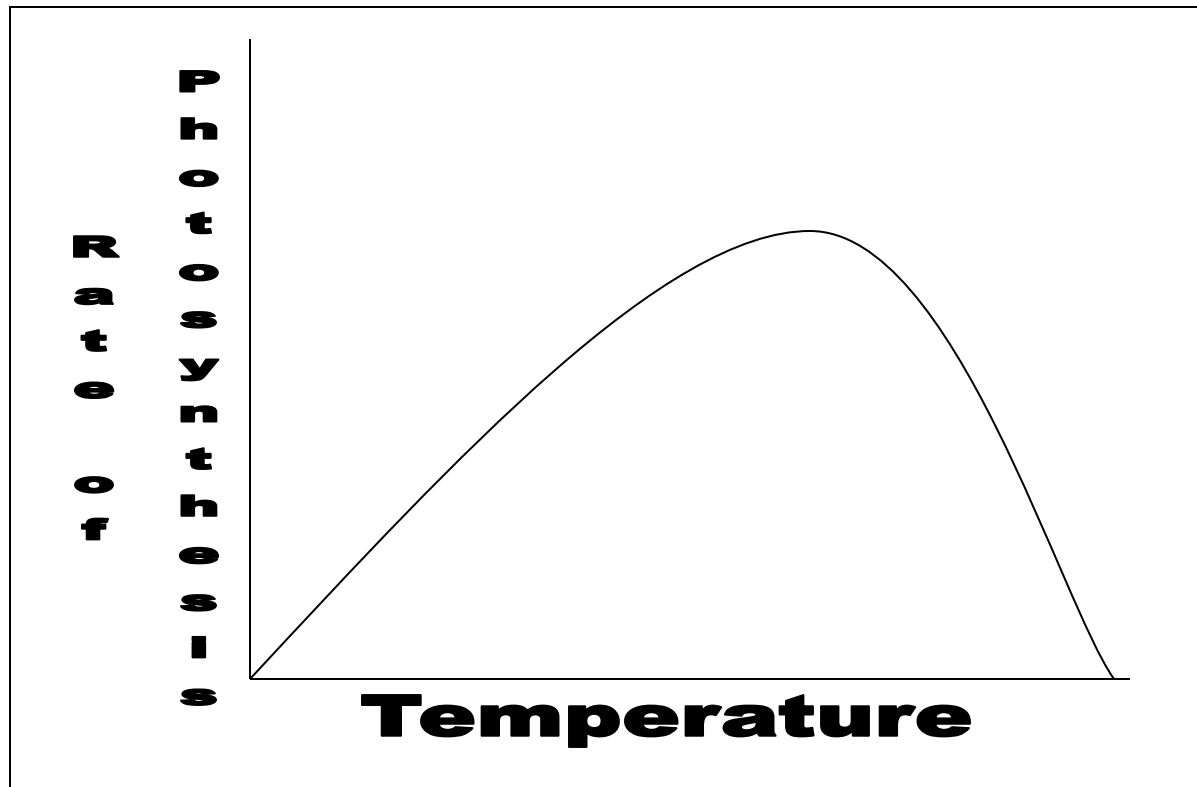


# Factors Affecting Photosynthesis

## Temperature

Enzymes work best between 0 and 35C

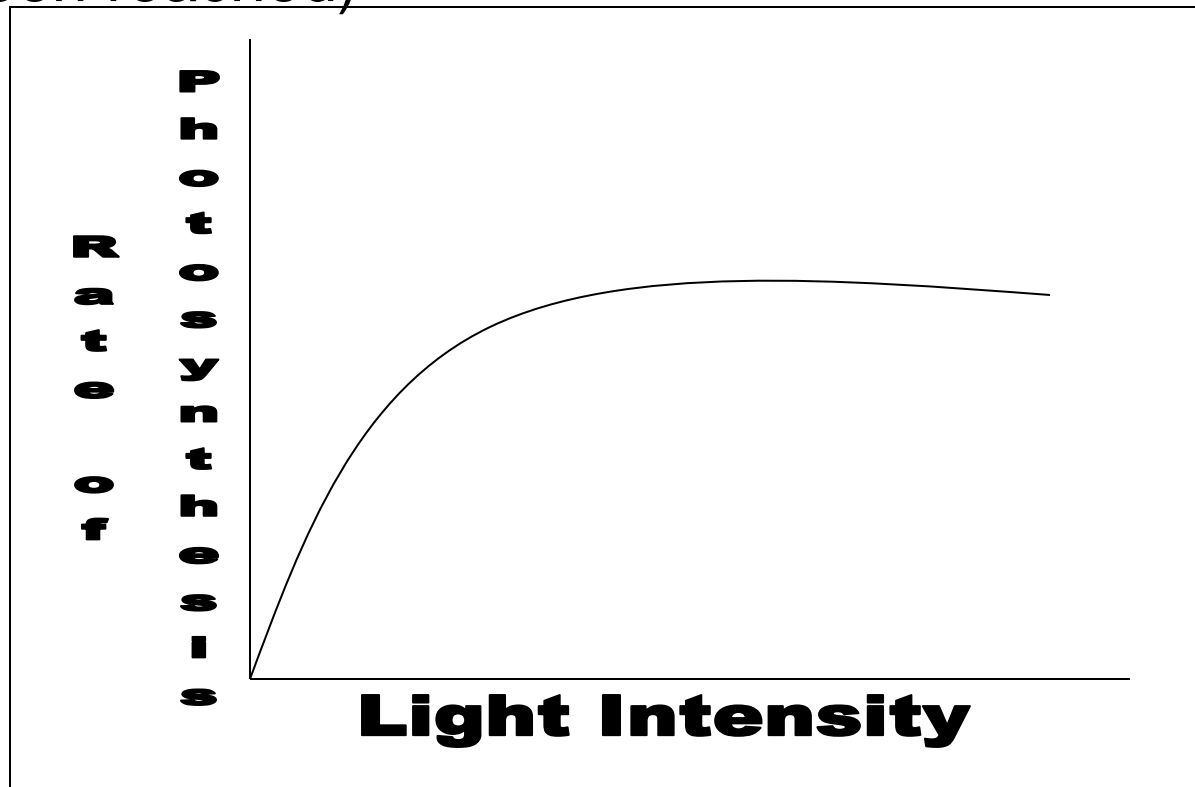
Too high or too low will slow or stop photosynthesis



# Factors Affecting Photosynthesis

## Light Intensity

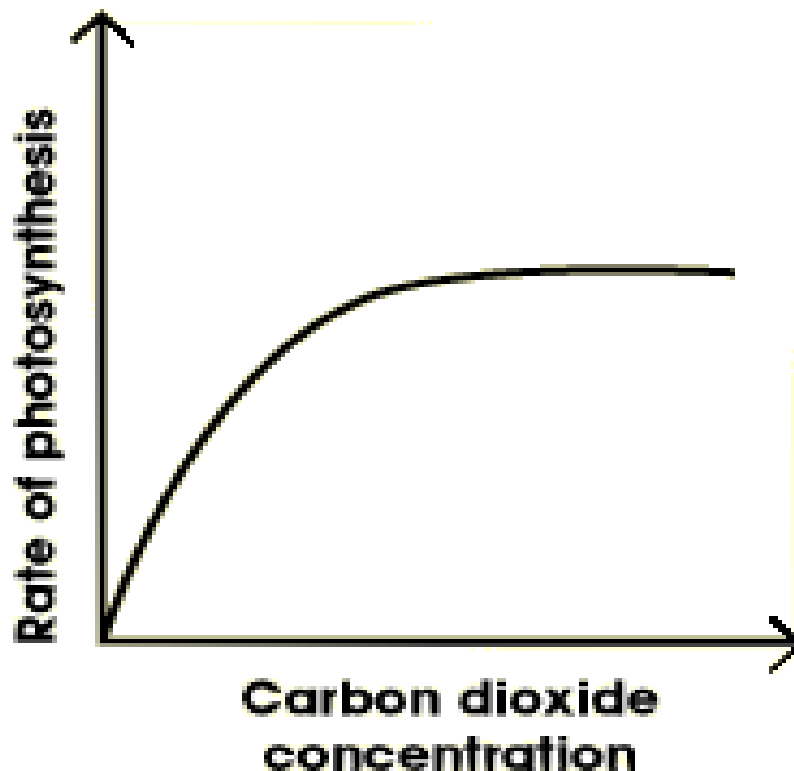
- Greater intensity increases rate of photosynthesis
- Will level off at some point (when max level has been reached)



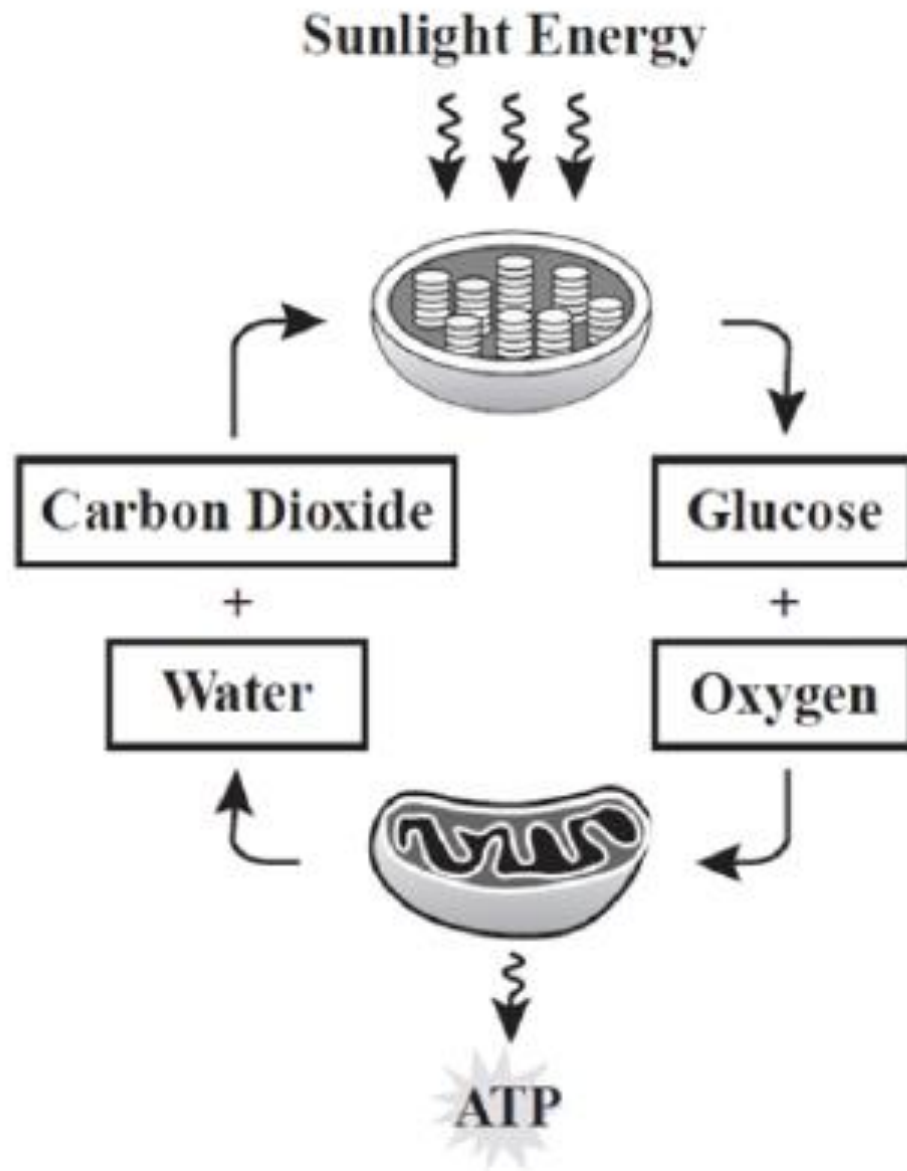
# Factors Affecting Photosynthesis

## Carbon Dioxide concentration

Even if there is enough light, if amount of  $\text{CO}_2$  is too low, photosynthesis will not happen.



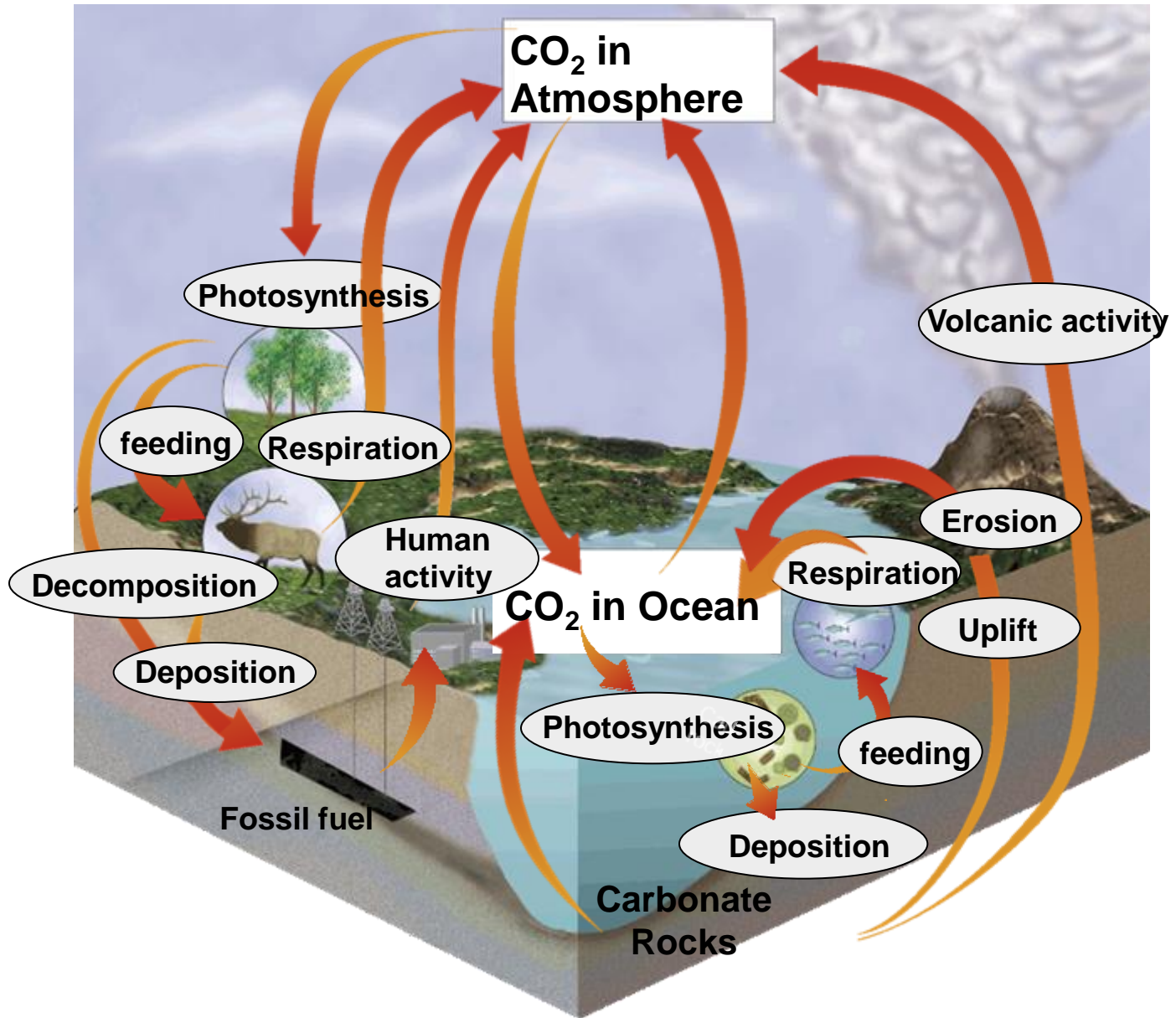
# Photosynthesis and Cellular Respiration



Plants do  
Both!



# The Carbon Cycle



# Photosynthesis vs. Cellular Respiration

	Photosynthesis	Cellular Respiration
Cell Organelle		
Energy Source		
Reactants		
Products		
Types of Organisms		